Singhurst, J.R. and W.C. Holmes. 2011. *Monarda luteola* (Lamiaceae): A new species from northeast Texas and southwest Arkansas. Phytoneuron 2011-41: 1–5. Published 6 Sep 2011. ISSN 2153 733X

MONARDA LUTEOLA (LAMIACEAE): A NEW SPECIES FROM NORTHEAST TEXAS AND SOUTHWEST ARKANSAS

JASON R. SINGHURST
Wildlife Diversity Program
Texas Parks and Wildlife Department
4200 Smith School Road
Austin, Texas 78704
Jason.singhursdt@tpwd.state.texas.us

WALTER C. HOLMES
Department of Biology
Baylor University
Waco, Texas 76798-7388
walter_holmes@baylor.edu

ABSTRACT

Monarda luteola, characterized by pale yellow flowers, is described as new. The species is limited in distribution to the Weches Formation of northeast Texas and adjacent Miller County, Arkansas. It is similar to and compared with *Monarda lindheimeri* of southwest Louisiana and southeastern Texas.

KEY WORDS: Lamiaceae, *Monarda*, *Monarda* sect. *Eumonarda*, Texas, Arkansas, Louisiana

Monarda lindheimeri Englem. & A. Gray, *M. fistulosa* L., and *M. russelliana* Nutt. ex Sims belong to a group of *Monarda* characterized by a single terminal flower cluster and flowers with the stamens exserted beyond the upper lip. This group was assigned the section name *Eumonarda* by Bentham (1835). McClintock & Epling (1942) referred to this name as a subgenus, but without correct name-bringing. Nonetheless, ISBN Art. 21.3 makes this name illegitimate. The three species are normally distinguished by flower color. *Monarda fistulosa* and *M. russelliana* have lavender to pink colored flowers, and, in *M. russelliana*, a red spotted lower lip. The flower color of *M. lindheimer*i has been variously described as "pallid" (McClintock & Epling (1942), "creamy white" (Correll & Johnston 1970), and "white" (Turner 1994). Basically, if a member of this group from east Texas has "white" flowers, it will likely key to *M. lindheimeri* in the mentioned works. An exception is *M. fistulosa* with albino flowers, which almost always has traces of pink or lavender, particularly in the veins.

Field studies in northeast Texas and adjacent Miller County, Arkansas, during the past several years have resulted in the recognition of a yellow flowered *Monarda* that has affinities with the group described above. These plants, which are limited in distribution to the clay iron ore hills of the Weches Geological Formation (University of Texas Bureau of Economic Geology 1979) of northeast Texas and adjacent Miller County, Arkansas, are here described as a new species.

Monarda luteola Singhurst and W. C. Holmes, sp. nov. (Fig. 1). **TYPE**: **Texas**. Morris County.: "Kennedy Mountain," 0.7 mile S of jct. of Farm Market Hwy 144 and County Road 2216 (White Road); N 32° 58' 31.04", W 94° 46' 47.44"; 24 May 2008, *W.C. Holmes & J.R. Singhurst 14012* (holotype: BAYLU; isotypes: Jarvis College, Hawkins, Texas; others to be distributed).

Monardae lindheimeri Engelm. & A. Gray similis sed differt foliis lanceolatis vel lanceolati-triangularibus basibus rotundatis vel truncatis vs. foliis ovatis vel deltatis basibus subcordatis vel cordatis.

Aromatic (with odor of lemon) perennial herb 40–66 cm tall; rhizomes 1.1–2.2 mm thick, 15 or more cm long; aerial stems erect, square, purplish-reddish or lined purplish-red at the angles; glabrate to sparingly to densely hirsute-hispid; internodes 4–6 or more cm long, mostly shorter than subtending leaves. Leaves opposite; petioles 4–11 mm long, sparingly to densely hirsute; blades of midstem leaves lanceolate to lanceolate-triangular; 4.3–8.4 × 2.3–3.7 cm, gradually shortening above and nearly sessile at the summit, basal leaves, if persisting smaller, leaves of sterile shoots larger and wider; surfaces hirsute-hispid; bases rounded-truncate to an acute insertion at the petiole to obscurely subcordate; margins coarsely serrate, teeth 3–7 mm distant, hirsute-hispid; venation pinnate with 8–10 pairs of hispid-hirsute secondary nerves evenly spaced over the blade; lower surfaces glandular-punctate and densely to moderated hispid-hirsute; upper surfaces moderately appressed hirsute and glandular punctate; apices acuminate. Glomerules one per stem, terminal, 2–3.5 cm wide (excluding corollas); bracts subfoliaceous, outer ovate, to 4.0 × 2.4 mm, hirsute-hispid to pubescent to calyx-like, apices awned, the inner bracts similar, smaller. Pedicels 0.2–0.5 mm long, glabrate to glandular-puberulent. Calyx tubular, ca. 10 mm long (not including awns), 10–13 nerved, surfaces puberulent with gland-tipped hairs; orifice teeth deltate, the orifice itself comose, the hairs about 0.8 mm long; awns 2.8–3.5 mm long, sparingly glandular and occasionally with glandular hairs. Corolla pale yellow, length 2.8–3.1 cm; tube 2.2 cm, basal portion glabrate, above glandular-atomiferous, pubescent; throat 0.8–1.1 mm, upper lip ca. 8 mm, glandular, pubescent, lower lip ca. 9 mm, glandular, pubescent. Carpels 2, deeply lobed and appearing as 4, ca. 1.3 mm tall; anthers 2, originating from the upper inner surface of corolla about 2 mm from the tips, filaments slender, ca. 18 mm long, 2-winged, each ca. 0.2 mm wide, anthers dorsifixed, 2.5 mm long. Styles ca. 3.6 cm long, winged (as anthers, *q.v.*); stigmas 2, anterior ca. 1.5 mm long, flattened-clavate, posterior vestigial to about 1 mm long. Nutlets 4, ellipsoid, 1.4–1.5 × 0.8–0.9 mm, roughly triangular in cross section, the distal surface slightly rounded, the two proximal surfaces flat; exocarp brown, glabrous, finely granular, the bases (scars) of the two inner surfaces (where connate to adjacent nutlets) widely elliptic, ca. 0.4 mm, sordid, spongy.

Phenology. Flowering begins in late April, peaking in late May to early June.

Etymology. The specific name alludes to the pale yellow flowers. In anticipation that the species will be assigned a common name, we are suggesting that it be called "yellow flowered beebalm."

Paratypes. [In the following list of paratypes, the acronym ETNC is used for the herbarium at Jarvis College, Hawkins, Texas. This acronym is not from Index Herbariorum nor is it used to designate any other herbarium.] **TEXAS**. **Cass Co.**: Tex. Hwy 49, south of Avinger off road near airport, 16 May 2001, *Holmes & Singhurst 11534* (BAYLU); Buzzard's Roost Mountain, on FM 729 near Lone Star, 16 May 2001, *Holmes & Singhurst 11539* (BAYLU); 0.6 mile south of jct. of County Road 4125 and Tex Hwy 43, 24 May 2006, *Holmes & Singhurst 13620* (BAYLU). **Marion Co.**: north side of Lake o' the Pines on County Road 2316, south of Rock Island, 12 May 1999, *Holmes & Singhurst 9962* (BAYLU, NLU). **Morris Co.**: Daingerfield State Park, 16 May 2001, *Holmes & Singhurst 11509* (BAYLU). **Upshur Co.**: Tex. Hwy 155, 0.4 mile W of jct. with FM 555, ca. 6 miles NE of Gilmer, 16 May 2001, *Holmes & Singhurst 11544* (BAYLU). **Wood Co.**: sandy pasture and edge of post oak woods ca. 4 mi. E of Lindale, 7 May 1991, *R. Kral 78614* (NLU); Hainesville, 4 mi. NW on CR 3250 × CR3256, 3 Jul 2011, *W. Godwin, M. Godwin, & C. Goodwin 135* (BAYLU, ETNC); Mineola, 4 mi. E Palmer Spring on CR 2650, 30 Jul 20100, *W. Godwin & D. MacBurnett 123* (BAYLU, ETNC); Hainesville, 4 mi. NW on CR 3250 × 3256, 9 Jul 2011, *W. Godwin 122*

(BAYLU, ETNC); Hainesville, 4 mi. S on Salesmanship Club, on gravelly Weches hills, 30 Apr 2011, *W. Godwin 121* (BAYLU, ETNC). **ARKANSAS. Miller Co.**: County Road 32, 0.1 mile E of jct with County Road 107 near Brightstar, 24 May 2006, *Holmes & Singhurst 13620* (BAYLU); County Road 107, 0.7 mile S of jct with Ark. Hwy 160 near Brightstar, 24 May 2006, *Holmes & Singhurst 13628* (BAYLU).

Monarda luteola is characterized by pale yellow flowers (10Y 9/8.5 /4 – 10Y 8.5/9 /4 as determined by comparison with the color plates of the Munsell Book of Color Glossy Collection (undated). The color is present in fresh corollas of all ages and does persist in pressed and dried materials if correctly prepared. Unfortunately, the flower color is unfailingly reported as "white" on specimen labels, thus the new species has long been treated as being *M. lindheimeri*, a species too widely interpreted so as to include the overwhelming majority of "white" flowered *Monarda* of east Texas. The qualitative nature of the protologue of *M. lindheimeri* can only be interpreted by reference to the types (*Lindheimer 151*), the holotype of which is said to be at GH (Turner 1994). Even though GH has two specimens of *Lindheimer 151*, it is safe to say that the holotype is barcoded 00001333), since the other specimen (barcode 00001334) was transferred from the Boston Society of Natural History to GH in October 1941. Two isotypes are housed at the Missouri Botanical Garden. While *Monarda luteola* and *M. lindheimeri* can be distinguished by flower color (pale yellow vs. "white") when in the fresh condition, it is possible that the flowers of *M. lindheimeri* may be pale yellow, but misreported, as is the case with *M. luteola*. No evidence of yellow flowers appears present in the preserved material of *M. lindheimeri* that we have studied. The two species, however, can be distinguished by use of the following key that was written for herbarium specimens. The key also serves to define our interpretation of the salient characteristics of *M. lindheimeri*.

1. Leaves ovate to ovate-deltate, shorter than internodes, 3–6 × 1.8–3.6 cm [$\bar{x}$ = 4.4 × 2.4 cm, n = 21], bases subcordate to cordate, secondary nerves are insertion of petiole retrorsely curved, blade surfaces hispid-hirsute and additionally densely shrouded with a fine puberulence (visible with lens); calyx finely puberulent, glandular hairs few or lacking ..... **Monarda lindheimeri**

1. Leaves lanceoate to lanceolate-triangular, usually as long or longer than internodes, 4.3–8.4 × 2.3–3.7 cm [$\bar{x}$ = 6.9 × 3 cm, n = 12], bases rounded-truncate to sometimes vaguely subcordate, secondary nerves at insertion of petiole antrorsely disposed, surfaces hispid-hirsute, fine puberulence lacking; calyx with glandular hairs ..... **Monarda luteola**

Other items that distinguish the species include odor and distribution. *Monarda luteola* has a strong scent of lemon (similar to *Hedeoma reverchonii* (A. Gray) A. Gray or *H. drummondii* Benth.). *Monarda lindheimeri* has a scent similar to *M. fistulosa* or *M. russelliana*, which may be described as a distinctly pungent gasoline-like odor, not at all pleasant. The distribution of *M. luteola* is confined to the Weches Geologic Formation of northeast Texas and adjacent Miller County, Arkansas. This is an area of red clay acidic soils on exposed iron ore ridges. *Monarda lindheimeri* is distributed in circumneutral soils of the lower part of the Gulf coastal plain from southwest Louisiana to Gonzales County, Texas. The two species are allopatric in distribution.

Pollinators: The following two insects were the most prominent pollinators of *Monarda luteola* at the time of collection of the type. (1) **bumblebee**, *Bombus* (probably), Hymenoptera, Apidae and (20 **skipper**, Lepidoptera, Hesperiidae.

IUCN Red List Category. The species is widespread and abundant within its distribution area and is considered to be of least concern (LC).

Figure 1. Holotype of *Monarda luteola* (*Holmes and Singhurst 14012*, BAYLU). Photograph by Darrell Vodopich.

Monarda luteola is amply abundant in Texas and of no conservation concern. In 2006, a total of 102 genets were located by Holmes and Singhurst (2007) in Miller County, Arkansas, all within one square mile (~2.6 sq. km). The genets were concentrated in three populations near the community of Brightstar. The area appeared to be a low quality pine plantation and may be subject to logging activities. The species should be of conservation concern within that state.

ACKNOWLEDGEMENTS

We wish to thank the many individuals who made contributions to this study. Foremost are Kenneth and Betty Kennedy, owners of the land from which the type specimens were collected and Belinda McCoy McLaughlin, who arranged for our visit to the site. Will Godwin of Jarvis College collected specimens, in particular fruiting specimens that enabled description of fruits and seeds. Matt White of Paris Junior College remarked on the scents of various species of *Monarda*. We are also grateful to Guy Nesom for translating the Latin diagnosis and reviewing the manuscript and to Darrell Vodopich of Baylor University for photographic services. The pollinators were identified by Robert Baldridge, an entomologist in the Department of Biology at Baylor University. The following herbaria provided loans of specimens or access to their specimens either by visit or by digital photographs: BRIT, DUKE, GH, JARVIS, LL, MO, MSC, NLU, SBSD, TEX, and US. In particular, we thank Alan Fryday of MSC for sending digital photographs of the types of *Monarda lindehimeri* at the request of GH.

LITERATURE CITED

Bentham, G. 1835 (1832-1836). Labiatarum genera et species: or a description of the genera and species of plants of the order Labiatae. James Ridgway & Sons, London.

Correll, D.S and M.C. Johnston. 1972. Manual of the vascular plants of Texas. Texas Research Foundation, Renner, Texas.

Holmes, W.C. and J.R. Singhurst. 2007. *Monarda lindheimeri* (Lamiaceae): New to Arkansas. J. Bot. Res. Inst. Texas 1: 717–718.

McClintock, E. and C. Epling. 1942. A review of the genus *Monarda* (Labiatae). Univ. of California Publ. in Botany 20(2) 147–194. Univ. California Press, Berkeley.

Munsell Book of Color. Undated. Munsell Color Services, Grand Rapids, Michigan .

Turner, B.L. 1994. Taxonomic treatment of *Monarda* (Lamiaceae) for Texas and Mexico. Phytologia 77: 56–79